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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(71) Applicant: <b>VERONA INC. [US/US]; NCNB Plaza, Suite 300, 7 North Laurens Street, Greenville, SC 29601 (US).</b>			
(72) Inventors: <b>FUSIAK, Frank; 368 Broadway, Apartment 11, Bayonne, NJ 07002 (US). NARAYANAN, Kolazi, S.; 452 7th Street, Palisades Park, NJ 07650 (US).</b>			
(74) Agents: <b>MAUE, Marilyn, J. et al.; International Specialty Products, 1361 Alps Road, Wayne, NJ 07470 (US).</b>			
(54) Title: <b>A HARDWOOD FLOOR CLEANING COMPOSITION COMPRISING AN ALKYL PYRROLIDONE</b>			
(57) Abstract			
<p>A hardwood floor cleaner composition is provided which is non-tacky, and cleans and shines in one-step, is free of silicones, does not dull the wood surface. The composition comprises (a) about 0.1-5 %, preferably 0.2-2 %, of a C<sub>6</sub>-C<sub>24</sub> alkyl pyrrolidone, preferably N-octyl-pyrrolidone; (b) about 0.1-5 %, preferably 0.2-1 %, of an anionic or nonionic surfactant, preferably sodium dodecyl sulfate; (c) about 1-5 %, preferably 2-4 %, of a shine booster, preferably a vinylpyrrolidone copolymer, such as vinylpyrrolidone-dimethylaminoethyl methacrylate (Gafquat® 755-N - ISP); and (d) about 0.5-2 %, preferably 0.8-1.5 %, of a film-former, for example, an acrylic emulsion, preferably Esi-Cryl® 405 (Emulsion Systems Inc.), which is 2-methyl-2-propenoic acid, copolymer with ethyl-2-propenoate, methyl-2-methyl propenoate and 2-propenoic acid, and (e) about 85-95 %, preferably 88-93 %, of water, or an alcohol, or mixtures thereof, by weight of the composition. A concentrate and an aqueous microemulsion of the composition of the invention also is provided herein.</p>			

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# A HARDWOOD FLOOR CLEANING COMPOSITION COMPRISING AN ALKYL PYRROLIDONE

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

This invention relates to hardwood floor cleaner compositions, and, more particularly, to a composition for this use which is non-tacky, cleans and shines in one-step, is free of silicones, and does not dull the wood surface being cleaned.

### 2. Description of the Prior Art

EPA 0467472A2 discloses a hard surface liquid cleaning composition with an anti-soiling polymer, which, however, is primarily used for bathroom porcelain and tiles. U.S. Patent 4,368,146 describes a light duty hand dishwashing liquid detergent composition for kitchen utensils and glasses.

## DETAILED DESCRIPTION OF THE INVENTION

In the hardwood floor cleaner composition herein, component (a) is a C<sub>6</sub>-C<sub>24</sub> alkyl pyrrolidone which functions effectively to clean the floor. Most preferred are alkyl pyrrolidones selected from N-octylpyrrolidone, N-dodecylpyrrolidone or mixtures thereof. Suitably component (a) is present in the composition in an amount of about 0.1-5%, preferably 0.2-2%, by weight of the composition.

Component (b) of the composition is a surfactant, and is preferably an anionic or nonionic surfactant. As representative of the anionic surfactant, alkali metal salts of C<sub>8</sub>-C<sub>22</sub> aliphatic surfactants such as

sodium dodecyl sulfate or sulfonate, alkali metal salts of alkyl aromatic sulfonates or sulfates, and ethoxylated derivatives of the above, such as the alkylphenyl ethoxylated phosphate esters, may be used. The anionic surfactants are believed to form pseudo salts or ion pairs with the higher alkyl pyrrolidone component (a), which can produce an advantageous synergistic effect on wetting and surface spreading for the composition. Sodium dodecyl (lauryl) sulfate is a preferred anionic surfactant. Component (b) suitably is present in an amount of about 0.1-5%, preferably 0.2-1%, by weight of the composition.

In combination, components (a) and (b) of the composition of the invention in a solvent such as water or alcohol, or mixtures thereof, provide a clear to slightly hazy aqueous microemulsion.

Component (c) of the composition provides a shine booster function for the composition. Suitable shine boosters are copolymers of vinylpyrrolidone, such as a copolymer of vinylpyrrolidone-dimethylaminoethyl methacrylate (Gafquat® 755-N - ISP); vinylpyrrolidone-vinyl acetate, vinylpyrrolidone-acrylic acid; and vinylpyrrolidone-methaminopropyl trimethyl ammonium chloride. The shine booster is present in the composition in an amount of about 1-5% as supplied, preferably 2-4%, of the composition; or 0.2 to 1.0% based on the solids content of the composition.

Component (d) of the composition provides a film-former function for the composition; it is present in an amount of about 0.5-2%, preferably 0.8-1.5%, of the composition. Suitable film-formers are acrylic emulsions, such as Esi-Cryl® 405 sold by Emulsion Systems Inc., which is a copolymer of 2-methyl-2-propenoic acid with ethyl-2-propenoate, methyl-2-methylpropenoate and 2-propenoic acid; styrene acrylic emulsion sold as Carboset® (Union Carbide); acrylic emulsions sold as Conrez (Morton Int.); and Joncryl (S.C. Johnson).

The combination of components (c) and (d) in the compositions forms a barrier of a water-film on the hardwood surface which prevents or reduces contact of the surface with oil or dirt thus keeping the appearance of the surface shiny and clean-looking.

Component (e) of the composition is water, or alcohol, or mixtures thereof, in an amount of about 85-95%, preferably 88-93%, by weight of the composition.

Optional ingredients in the composition of the invention include a neutralizing agent for the acrylic emulsion to make it clear; a plasticizer; a fragrance; a bittering agent; dyes; and auxiliary surfactants to improve leveling.

The composition may be applied to a wood surface by spraying, then damp mopping, or the concentrate may be added to a bucket of water, mixed, and then applied using a damp mop.

TABLE 1

<u>CONCENTRATE</u>		
<u>Component</u>	<u>Suitable</u>	<u>Preferred</u>
(a) Surfadone LP-100	1-50	6.12
(b) Stepanol WAC	1-50	10.20
(c) GAFQUAT 755-N	10-50	25.51
(d) Esi-Cryl 405	5-50	24.49
(e) Isopropanol or Water	10-70	30.61
Lemon Fragrance		1.02
Zonyl FSO		2.04
Ammonium hydroxide		1.30

The microemulsion composition of the invention is made by a given amount of the concentrate with water, or alcohol, or mixtures thereof, in a 1:10 ratio. The resultant aqueous microemulsion composition is shown in Table 2 below.

TABLE 2  
AQUEOUS MICROEMULSION COMPOSITION

	<u>Preferred</u>
(a) Surfadone LP-100	0.6
(b) Stepanol WAC	1.0
(c) GAFQUAT 755-N	2.5
(d) Esi-Cryl 405	2.4
(e) Deionized water	90.2
Isopropanol	3.0
Lemon Fragrance	0.1
Zonyl FSO	0.2
Ammonium Hydroxide Q.S. to pH = 8.5	

The compositions listed in the Table below were prepared by mixing the several components of the composition at ambient conditions in the order listed until a clear, homogeneous solution was obtained. Then 5.0 g of each formulation was applied onto a clean glass plate, and wiped evenly with a damp sponge and allowed to air-dry. The resultant appearance of the film was evaluated for clarity and tackiness. Formulations that produced clear, non-tacky films were tested on hardwood floor tiles as follows: 5 ml of a given formulation was applied to a 6 inch by 6 inch prefinished TopFlor Oak Grain Parquet Genuine Hardwood Floor Tile and wiped clean over the surface with a damp sponge. After air drying, the 60° specular gloss was measured before and after cleaning using a BYK-Gardner micro-TRI-gloss gloss meter, and the change in gloss was calculated. The results are shown below in Table 3.

pH = 8.5

TABLE 3  
EXAMPLES 1-6

## COMPOSITIONS

Components	1	2	3	4	5	6	7
(a) Surfadone® LP-100	0.6	0.6	0.6	0.6	0.6	0.6	0.6
(b) Sodium lauryl sulfate (29%)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
(c) GAFQUAT® 755-N	2.5	-	5.0	2.5	-	-	-
PVP/VA E-335	-	-	-	-	2.0	-	-
PVP/VA E-735	-	-	-	-	-	2.0	-
GAFQUAT -100	-	-	-	-	-	-	5.0
(d) Esi-Cryl 405	-	2.5	2.4	2.4	2.4	2.4	2.4
Zonyl FSO	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lemon Fragrance	0.1	0.1	-	-	-	-	-
(e) Deionized water	92.6	92.6	87.7	90.3	90.8	90.8	87.7
Isopropanol	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Ammonium hydroxide	Q.S. to pH = 8.5						
Results							
Glass test	clear	clear	clear	clear	hazy	hazy	hazy
‡ Gloss Change on Hardwood Floor	5.8	-2.5	50.3	19.1	n.t.	n.t.	n.t.



While the invention has been described with particular reference to certain embodiments thereof, it will be understood that changes and modifications may be made which are within the skill of the art. Accordingly, it is intended to be bound only by the following claims, in which:

## WHAT IS CLAIMED IS:

1. A hardwood floor cleaner composition comprising, by weight of the composition,
  - (a) about 0.1-5% of a C<sub>6</sub>-C<sub>24</sub> alkyl pyrrolidone,
  - (b) about 0.1-5% of a surfactant,
  - (c) about 1-5% of a shine booster,
  - (d) about 0.5-2% of a film-former, and
  - (e) about 85-95% of water or alcohol, or mixtures thereof.
2. A hardwood floor cleaner according to claim 1 wherein:
  - (a) is about 0.2-2%,
  - (b) is about 0.2-1%,
  - (c) is about 2-4%,
  - (d) is about 0.8-1.5%, and
  - (e) is about 88-93%.
3. A hardwood floor cleaner composition according to claim 1 wherein:
  - (a) is N-octylpyrrolidone, N-dodecylpyrrolidone, or mixtures thereof;
  - (b) is an anionic or nonionic surfactant;
  - (c) is a copolymer of vinylpyrrolidone and a polymerizable monomer; and
  - (d) is an acrylic emulsion.

4. A hardwood floor cleaner according to claim 1 wherein:

- (a) is N-octylpyrrolidone or N-dodecylpyrrolidone;
- (b) is sodium dodecyl sulfate, sodium dodecyl sulfonate; a sodium salt of an alkyl aromatic sulfonate or sulfate, or ethoxylated derivatives thereof;
- (c) is a copolymer of vinylpyrrolidone and dimethylaminoethyl methacrylate, a copolymer of vinylpyrrolidone and acrylic acid, a copolymer of vinylpyrrolidone and vinyl acetate; or a copolymer of vinylpyrrolidone and methaminopropyl trimethyl ammonium chloride;
- (d) is an acrylic emulsion of 2-methyl-2-propenoic acid copolymer with ethyl-2-propenoate, methyl-2-methyl propenoate and 2-propenoic acid, or an acrylic-styrene emulsion and
- (e) is predominately water.

5. A hardwood floor cleaner according to claim 1 wherein:

- (a) is N-octylpyrrolidone,
- (b) is sodium dodecyl sulfate,
- (c) is a copolymer of vinylpyrrolidone and dimethylaminoethyl methacrylate,
- (d) is an acrylic emulsion of 2-methyl-2-propenoic acid copolymer with ethyl-2-propenoate, methyl-2-methyl propenoate and 2-propenoic acid, and
- (e) is predominately water.

6. A concentrate of a hardwood floor cleaner composition according to claim 1 wherein

- (a) is about 1-50%,
- (b) is about 1-50%,
- (c) is about 10-50%,
- (d) is about 5-50%, and
- (e) is about 10-70.

7. A method of cleaning and shining a hardwood floor in one step to provide a cleaned and shiny wood surface which also is non-tacky, and free of silicones, which comprises applying the hardwood floor cleaner composition of claim 1 to a hardwood floor and wiping the applied surface cleaner after a predetermined period of application.

## INTERNATIONAL SEARCH REPORT

 International application No.  
PCT/US94/03999

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC(5) : C11D 1/14, 3/36, 3/37 US CL : 252/542, 174.23, 174.24, 549 According to International Patent Classification (IPC) or to both national classification and IPC				
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) U.S. : 252/542, 174.23, 174.24, 549 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Please See Extra Sheet.				
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
Y	EP, A, 0 467 472 (Wisniewski) 22 January 1991, col. 6, lines 31-35, col. 7, lines 54-59, col. 6, lines 50-55	1-4, 6-7		
Y	US, A, 4,710,374 (Grollier et al.) 01 December 1987, col. 2, lines 55-60, col. 3, lines 25-30, col. 11, lines 5-8.	1-6		
Y,P	US, A, 5,252,245 (Garabedian et al.) 12 October 1993, col. 5, lines 55-62.	1		
Y	JP, A, 50-10274 (Minnesota Mining Co.) 19 April 1975, See abstract.	3		
Y	US, A, 5,093,031 (Login et al.) 03 March 1992, col. 4, lines 25-30 and col. 8, lines 65-80.	1		
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.				
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PCT/US94/03999

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 5,041,235 (Kilbarger) 20 August 1991, See-entire document for background information.	1
A	US, A, 4,230,605 (Connolly et al.) 28 October, 1980, See entire document for background information .	1

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International application No.  
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## B. FIELDS SEARCHED

Electronic data bases consulted (Name of data base and where practicable terms used):

APS

search terms: alkyl (2a) pyrrolidone, surfactant/ or surface active, alcohol/ or water, copolymer (5a) vinylpyrrolidone, acrylic emulsion, shine booster, and film former.